METHYL BROMIDE CRITICAL USE RENOMINATION FOR POST-HARVEST -- COMMODITIES

NOMINATING PARTY: The United States of America

FILE NAME: USA CUN14 **POST HAVEST USE FOR COMMODITIES**

BRIEF DESCRIPTIVE TITLE OF NOMINATION:

Methyl Bromide Critical Use Nomination for Post Harvest Use on Commodities (Submitted in 2012 for 2014 Use Season)

QUANTITY OF METHYL BROMIDE REQUESTED IN EACH YEAR OF NOMINATION:

TABLE 1: QUANTITY OF METHYL BROMIDE REQUESTED IN EACH YEAR OF NOMINATION

YEAR	NOMINATION AMOUNT (KILOGRAMS)
2014	**740 kg**

(Details on this page are requested under Decision Ex. I/4(7), for posting on the Ozone Secretariat website under Decision Ex. I/4(8).)

In assessing nominations submitted in this format, TEAP and MBTOC will also refer to the original nomination on which the Party's first-year exemption was approved, as well as any supplementary information provided by the Party in relation to that original nomination. As this earlier information is retained by MBTOC, a Party need not re-submit that earlier information.

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Following the requirements of Decision IX/6 paragraph (a)(1) The United States of America has determined that the specific use detailed in this Critical Use Nomination is critical because the lack of availability of methyl bromide for this use would result in a significant market disruption. ■ *Yes* ☐ *No*

_____________________________ _______________________________ _______________

Signature Name Date

Title: ____

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LIST OF DOCUMENTS SENT TO THE OZONE SECRETARIAT IN OFFICIAL NOMINATION PACKAGE:

1. PAPER DOCUMENTS: **Title of paper documents and appendices**	**No. of pages**	**Date sent to Ozone Secretariat**
2. ELECTRONIC COPIES OF ALL PAPER DOCUMENTS: ***Title of each electronic file (for naming convention see notes above)**	**No. of kilobytes**	**Date sent to Ozone Secretariat**
USA CUN14 POST HARVEST: COMMODITIES		

* Identical to paper documents

METHYL BROMIDE CRITICAL USE RENOMINATION FOR POST-HARVEST -- COMMODITIES

1. SUMMARY OF NEED FOR METHYL BROMIDE

Commodity fumigation with methyl bromide is used primarily at harvest time, when rapid fumigation is needed to keep up with the large volumes of incoming commodities and when commodities are in storage.

The USG is requesting methyl bromide for this sector to allow time for the industry to purchase equipment, build chambers, modify structures, and/or develop experience using alternatives.

Sulfuryl fluoride, as ProFume®, remains registered for the uses included in this nomination in the U. S. EPA has published a proposed order to revoke tolerances; however, for the purposes of this nomination, USG is assuming that sulfuryl fluoride will continue to be available. For additional information, please refer to the links on EPA's website: http://www.epa.gov/oppsrrd1/registration_review/sulfuryl-fluoride/evaluations.html.

TABLE 2. NOMINATION AMOUNT

2014 Methyl Bromide Usage Newer Numerical Index (BUNNI)

Transition Use Reduction Description Spreadsheet

SECTOR		COMMODITIES			
		California Dried Plum Board	California Walnut Commission	California Date Commission	Sector Total
Quantity Requested for 2013:	Amount (kgs)	282	179	361	822
Quantity Recommended by MBTOC/TEAP for 2013 :	Amount (kgs)	282	179	361	822
Quantity Approved by Parties for 2013:	Amount (kgs)	282	179	361	822
	Volume (1000 m^3)	12	4	17	-
	Rate	23	48	21	-
Transition from 2014 Baseline Adjusted Value	Percentage (%)	-10%	-10%	-10%	-
Quantity Required for 2014 Nomination:	Amount (kgs)	**254**	**161**	**325**	**740**
	Volume (1000 m^3)	**11.0**	**3.4**	**15.5**	**-**
	Rate	**23**	**48**	**21**	**-**

2. SUMMARIZE WHY KEY ALTERNATIVES ARE NOT FEASIBLE

This sector includes walnuts, dried fruit (prunes, raisins, figs), and dates, all of which are subject to infestation by several insect pests. Since infestation begins in the field, methyl bromide is used to rapidly fumigate harvested commodities and to disinfest commodities in storage. Most fumigation occurs over several weeks, during the peak production season, as the bulk of the harvest moves from the field into storage and shipping channels. Upon arrival from the field, each load is fumigated with methyl bromide in preparation for shipment to national and international markets.

Research with sulfuryl fluoride indicates that this fumigant is a potential methyl bromide alternative for commodities, provided fumigation occurs at temperatures above 70ºF. Recent studies have shown that under vacuum or atmospheric conditions, sulfuryl fluoride is effective against adult, pupal, and larval stages of stored product pests. The ovicidal efficacy of sulfuryl fluoride is dependent upon temperature and exposure time.

Walnuts – Quick turn-around time for walnuts at peak harvest time is the primary justification for methyl bromide use in this sector. Vacuum fumigation with methyl bromide may take 4-6 hours and atmospheric fumigation approximately 8-24 hours. Phosphine gas fumigation takes approximately three days and is the primary fumigant used for walnuts in storage.

Use of sulfuryl fluoride is limited during the peak fumigation because of low temperatures. Industry experts observe that the walnut industry fumigates during 6 months of the year when temperatures are at or below 50°F and provide supporting temperature data for the San Joaquin and Sacramento Valleys of California, their main production areas. Methyl bromide is still critical to accommodate the throughput of walnuts during this peak harvest when the temperatures are low.

Dates – Methyl bromide is used to rapidly fumigate California dates at harvest time, when up to a million pounds per day are being harvested within a relatively tight timeframe during the fall. These dates are harvested by hand, and growers need to get them to the marketplace in three days for maximum value. Although several insects may infest dates, the carob moth, *Ectomyelois ceratoniae*, is the most damaging species. The California Date Commission reports that it is currently testing the efficacy of sulfuryl fluoride on dates, in collaboration with Dow AgroSciences and Dr. Spencer Walse of USDA. Dr. Walse's preliminary results show less than adequate egg kill, even when the amount used is twice that needed for comparable methyl bromide fumigation. Phosphine takes longer, 5 to 7 days, to fumigate dates, and during this time the dates ferment, resulting in an off-flavor and an unmarketable product.

Dried Fruit – Methyl bromide is used to disinfest dried fruit in storage when the fruit is stored at processing facilities. Phosphine would corrode the electrical and electronic equipment in the processing areas. Phosphine also takes longer to fumigate and would consequently shut down the processing area as well. Sulfuryl fluoride is currently labeled for use on dried fruit; however, research results presented at the 2009 MBAO meeting (Walse et al., 2009), indicate that under low temperatures and current label rates, efficacy is inadequate against the eggs of the major stored product pests (dried fruit beetle, red flour beetle, and Indianmeal moth). Control of the egg stages of target pests is imperative.

USG is requesting methyl bromide for this sector to allow time for the industry to purchase equipment, build chambers, modify structures, and/or develop experience using alternatives.

The current registration of sulfuryl fluoride, as ProFume®, remains unchanged in the U. S. for the uses included in this nomination and is considered to be a viable alternative for some uses. However, it should be noted that EPA has published a proposed order to revoke all tolerances in response to a petition. For additional information, please refer to the links on EPA's website: http://www.epa.gov/oppsrrd1/registration_review/sulfuryl-fluoride/evaluations.html.

3. SUMMARY OF RECENT RESEARCH

Dr. Liu (2011) investigated the potential of oxygenated phosphine on insect pests of lettuce. Dr. Liu included a stored product pest, Indianmeal moth, in his investigations and found that a 48-hour fumigation in chambers with 30% oxygen content did result in significant mortality of larvae and eggs. This is only one study and much more research needs to be done, especially with tree nuts and dried fruit. However, this could be an area of future research for the industry.

Burks and Kuenen (2011) investigated the potential of mating disruption in Indianmeal moths in chambers to protect stored products. Results were consistent with observations for orchard pests. Indianmeal moth males oriented to mating disruption dispensers; significantly more males were captured with 10 mg lures than with females; mating disruption suppressed males in female-baited traps; and no residual effect after mating disruption dispensers removed. In addition, preference for high-load lures over females decreased with age. While this was a preliminary study, and no economic analysis was included, mating disruption in storage chambers may be a potential area for further investigation.

Walse et al. (2009) have demonstrated that sulfuryl fluoride does not readily kill egg stages of navel orangeworm or the eggs of several stored product insects at temperatures below 70°F at, or below, maximum label rates. USDA/ARS researchers plan to continue testing the efficacy and practicality of using sulfuryl fluoride, relative to methyl bromide, to control post-harvest pests of nuts and dried fruit. Sulfuryl fluoride thus appears to be an effective methyl bromide alternative for in-shell walnuts only when temperatures are at or above 70^{o} F.

Because temperatures at night can fall below 70°F, further research is needed on the ovicidal efficacy of sulfuryl fluoride as well as on the ovicidal efficacy of propylene oxide (PPO)/sulfuryl fluoride combinations. The Dried Fruit Association of California hopes to continue its investigations of combinations of PPO and sulfuryl fluoride and carbon dioxide (CO_2). Muhareb's (2009) presentation at the 2009 MBAO noted that adding carbon dioxide increased the larval efficacy of the PPO+SF mixture. This combination also was more efficacious on eggs.

Past data showed red flour beetle (RFB) larvae fumigated with PPO had an LD_{95} using 606 mg·h/l SF is just the opposite requiring higher concentration x time (CT) product for the eggs, LD_{95} 966 mg·h/l,10% CO_2 was the most effective. Without CO_2, combining the two fumigants together showed a LD_{95} of 432 on RFB eggs and a LD_{95} of 353 on RFB larvae. Adding 10% CO_2 reduces the dosages by about two-thirds of the fumigants used alone. The CO_2 along with the synergy of the blend reduces cost, lowers environmental emission and provides greater safety. (Muhareb 2009)

Reichmuth and Klementz (Barakat et al., 2009) discussed at the 2009 MBAO possible investigations to overcome the inability of sulfuryl fluoride to control the egg stage of many stored product pest insects. These included combinations of gases such as sulfuryl fluoride with phosphine or carbon dioxide. They also proposed using heat to increase the efficacy of sulfuryl fluoride. Their preliminary data demonstrated that these combinations show promise for many stored product pests of dried fruits and tree nuts. (Barakat et al., 2009)

Reichmuth, also at the 2009 MBAO, presented data regarding sulfuryl fluoride efficacy on the eggs of the rice moth *Corcyra cephalonica*. He showed that older eggs were more tolerant of sulfuryl fluoride than were the young eggs. His data show that by increasing the exposure time the difference between the ages of the eggs is reduced and disappears. His results indicated that full control was achieved at a concentration of 4.19 mg/l sulfuryl fluoride only after 5 days of fumigation (CT=120 x 4.19mgh/l=502mgh/l); 5.24 mg/l were sufficient to control all investigated eggs with exposure of 4 days (CT=503 mgh/l); and 5 days (CT=628 mgh/l), as well as three days old eggs with 3 d fumigation (CT=377 mgh/l). Three days fumigation served to kill all eggs of all ages with 6.24 mg/l (ct=449mgh/l). These ct-products are in range with corresponding values for lethal ct products for the other related stored product pest moths *Ephestia kuehniella*, *Plodia interpunctella* and *Ephestia elutella* (Barakat et al., 2009).

Williams (2009), of Dow AgroSciences, presented the results of sulfuryl fluoride investigations on carob moth (*Ectomyelosis ceratonia*) or CM in freshly harvested dates. Complete mortality of eggs and larvae was achieved with 332 oz-h/MCF (thousand cubic feet) (g-h/m^3) CT dosage of sulfuryl fluoride (ProFume®) at 21°C (70°F) during a 14-h exposure (essentially 1.48 lbs/MCF). Compare that to 1.5 lb/MCF of MB, for chambers with a moderate HLT (half loss time) of 20 h and a short, overnight exposure of 16 h (Williams, 2009).

Williams (2009) reported that chamber fumigation needing a quick overnight turnaround represents ≈ 30% of the date production fumigations. The remaining 70% of the fumigations occur in 5.0-MCF stacks of bins under tarps in the open yard, when time is not critical and the tarps may be kept sealed for weeks or even months. With the anticipated 50+ h HLT actually measured with the tarps in 2007, a fumigation using only 1.3 lb/MCF of ProFume would require 16 h to achieve 300 oz-h/MCF for carob moth control. Further gas savings can occur by extending the exposure time. At 50-h HLT and 72-h exposure, a 300 oz-h/MCF CT dosage for ProFume can be achieved applying only 0.4 lb MCF. (Williams, 2009)

Williams (2009) reported that the CM efficacy of sulfuryl fluoride at 300 oz-h/MCF CT dosages combined with good HLT, which can be achieved with good structural sealing techniques, and demonstrate that sulfuryl fluoride is an equivalent (weight: weight) alternative to methyl bromide in fresh dates for short-exposure overnight fumigations. When extended exposures are possible in tarped stacks, sulfuryl fluoride becomes superior (weight: weight) to methyl bromide. Williams (2009) concludes that his study demonstrates that in all aspects (technical, practical & economical), sulfuryl fluoride is a viable alternative to methyl bromide for fumigation in dates and is available as an immediate industry replacement for methyl bromide.

Hosoda (2009), of Cardinal Professional Products, presented an update of sulfuryl fluoride uses in post-harvest at both the 2009 and 2010 MBAO conferences. Mr. Hosoda reported that the walnut industry began to transition to sulfuryl fluoride in 2008, and made rapid progress in 2009 away from methyl bromide. Mr. Hosoda reported that one of the concerns with some of the major processors was the control of the egg stage of the Navel orangeworm (NOW), which is primarily a field pest that comes in with the product after harvest. It has recently been found that it is critical to control the egg stage of the NOW, because it can proliferate in storage. Dow AgroSciences funded a project with the Dried Fruit and Tree Nut Association (American Council for Food Safety and Quality) to evaluate sulfuryl fluoride's (ProFume's®) efficacy on walnuts infested with NOW eggs. The results showed that sulfuryl fluoride, when applied under vacuum, will effectively control over 99% of the egg stage. USDA recently performed efficacy studies under similar conditions with methyl bromide, and found egg survival to be 31%-43% depending on the dose. These data created a comfort level for many walnut processors to make the conversion to sulfuryl fluoride (Hosoda, 2009).

4. ECONOMIC ANALYSIS OF TRANSITION TO ALTERNATIVES

TABLE 3. ECONOMIC SUMMARY FOR EACH ALTERNATIVE

METHYL BROMIDE ALTERNATIVE	ECONOMIC SUMMARY
PHOSPHINE	Phosphine is a viable alternative for walnuts and dried fruit but not for dates. In the case of both walnuts and dried fruit, use of phosphine as a primary fumigant will require purchase of additional fumigation chambers due to longer fumigation time. Economic losses will be incurred initially as a result of investment in additional chambers. This loss will be greater for walnuts.
SULFURYL FLUORIDE	SF is a viable alternative for walnuts, dried fruit, and dates. SF costs less per lb than MeBr, but application rates may be higher.

A separate economic analysis of alternatives was conducted for each commodities sub-sector: walnuts, dried fruit, and dates. The economic analyses of transition to alternatives are based on the cost of transitioning the total commodity treated with quantity authorized by the Parties for 2013 to the technically feasible alternatives. After the investment in additional fumigation space, the cost of fumigating with phosphine would be lower than fumigating with methyl bromide. The cost to transition to SF is negligible for both walnuts and dried fruit.

The analyses focus on the differences in the cost of fumigant gas and the cost of fumigation space (i.e., fumigation chambers) between methyl bromide and the alternatives. It does not take into account any losses that might occur due to differences in product performance (i.e., efficacy) against different life stages of the target pests. The analysis of fumigation space is applicable only to a transition to phosphine for walnuts and dried fruit. Shifting to sulfuryl fluoride would not require the purchase of additional chambers. Transition to phosphine in these sectors would require an initial investment in additional chambers. In dried fruit, the number of chambers needed is expected to be small since there is not a "harvest window" issue. The chambers are needed to avoid the need to fumigate in the storage warehouse. In the case of walnuts, many more additional chambers will be needed to accommodate the throughput during the harvest window. Since phosphine takes five times as long as methyl bromide or sulfuryl fluoride, five times as many chambers would be necessary to achieve the same turnaround time. Due to the need to purchase additional fumigation space, there would be an initial investment cost in the first year to purchase additional fumigation chambers. After the first year, however, the cost of fumigating with phosphine would be lower than fumigating with methyl bromide because the cost of the gas and the application rates are considerably lower. The cost to transition to SF is negligible for both walnuts and dried fruit.

In the case of dates, sulfuryl fluoride is the only viable alternative. Fumigation with sulfuryl fluoride requires slightly higher application rates, but the transition results in a small cost savings due to its lower price relative to methyl bromide.

<u>Walnuts</u>

The United States walnut industry is concentrated in the state of California. Both production and sales peak in the fall in anticipation of the holiday season in December. Approximately 20 percent of walnuts are sold in the shell.[1] The remaining 80 percent are shelled and processed further to create a variety of packaged shelled products. All walnuts must be fumigated before they are put in to long-term storage or continue in the processing chain. Phosphine can be used for the 80 percent of walnuts that are allocated for packaged shelled products because turnaround time is not crucial. For the 20 percent that are sold in-shell, they are sold in a short period of time very close to harvest time. A rapid fumigant is needed to accommodate the throughput during this critical window.

Table 4 displays information on the walnut industry and methyl bromide authorized by the Parties in 2013. Over the period from 2006 through 2010, an average of approximately 372,000 metric tons of walnuts valued at nearly $740 million were produced each year.

Table 4. Summary information on walnut industry and methyl bromide

Production, Value, and Cost	
Commodity Metric Tons Produced per Year [1]	371,946
Gross Revenue per Metric Ton [2]	$ 1,989
Total Annual Gross Revenue	$ 739,639,999
MeBr Use	
MeBr Authorized by Parties 2013 (kg)	179
Commodity Treated with 2013 Authorized MeBr (cu m) [3]	7,450

[1] Five year average from USDA NASS, 2006-2010.
[2] Based on five-year average price from USDA NASS of $1,804 per U.S. short ton, 2006-2010.
[3] Based on use rate of 1.5 lbs per 1,000 cubic feet, 24 kgs per 1,000 cubic meters.

A sulfuryl fluoride treatment can be conducted in roughly the same amount of time as a methyl bromide treatment, which is assumed to be eight hours total, four hours for fumigation and four hours for aeration. Assuming a 24 hour cycle, three fumigations per day are conducted during peak harvest for both methyl bromide and sulfuryl fluoride. Although the sulfuryl fluoride column displays a cost for fumigation chambers, it is assumed that this number of chambers or equivalent space is already available for methyl bromide fumigation and could be transitioned to sulfuryl fluoride use with no additional cost. No additional chambers are needed. The analysis indicates a small cost savings each year ($1,973 per 125 cubic meter) from a transition to sulfuryl fluoride. (Table 5)

A switch to phosphine would require additional days of treatment time due to the longer treatment time for phosphine compared to methyl bromide (approximately five times longer). The current analysis examines the cost of purchasing additional fumigation chambers to accommodate the throughput of walnuts during peak harvest time. The analysis assumes that all

[1] On average, approximately 82,600 short tons are sold in-shell out of 410,000 short tons total production. (USDA NASS, 2006-2010). This is different from 11 percent value reported in 2013 CUN because units of sold in-shell walnuts were reported two different ways in USDA NASS reports, as tons and as thousands of lbs. This analysis assumes that the numbers in the reports refer to tons.

in-shell walnuts are fumigated within 45 days. Assuming that all walnuts are harvested in this short period likely overestimates the number of additional chambers that will be needed since not all walnuts harvested are fumigated within a 45-day window.

Based on this analysis, the cost to transition the commodity treated by 179 kgs of methyl bromide to phosphine would be a $30,000 initial investment in additional chambers. After the initial investment in additional chambers, the industry will experience a small cost savings each year ($5,640) from using phosphine.

The results of the economic analysis for walnuts are presented in Table 5.

Table 5. Analysis of transition to alternatives for walnuts treated with methyl bromide

		Methyl Bromide	Sulfuryl Fluoride	Phosphine
1	Cubic meters to be treated with 2013 authorized MeBr [1]	7,450	7,450	7,450
2	Capacity of fumigation chamber (cu m) [2]	125	125	125
3	Days of harvest [3]	45	45	45
4	One day capacity of each chamber (cu m) [4]	374	374	25
5	Total chambers needed [5]	1	1	7
6	Total Cost of Fumigation Chambers (@ $5,000 each) [6]	$ 5,000	$ 5,000	$ 35,000
7	Cost difference between MeBr and alternative	na	$ -	$ 30,000
8	Total gas for cubic feet needing fumigation (kgs) [7]	179	239	30
9	Price of fumigant gas ($/kg)	$ 33.07	$ 16.53	$ 9.37
10	Total cost of fumigant gas ($)	$ 5,919	$ 3,946	$ 280
11	Cost difference between MeBr and alternative		$ -1,973	$ -5,640
12	Total cost of fumigation space + fumigant	$ 10,919	$ 8,946	$ 35,280
13	Total cost difference between MeBr and alternative		$ -1,973	$ 24,360
14	Cost difference as % of gross revenue (from Table 4)		0.00%	0.00%

[1] From Table 4.
[2] Size of fumigation chamber (5,500 cubic feet or 156 cubic meters) based on size of dry freight van trailer found at www.pensketruckrental.com/commercial-truck-rentals/trailer-truck/, (Accessed Dec 16, 2011); reduced by 20% to account for air space in fumigation chamber.
[3] Analysis assumes that all commodity to be treated is treated within this time period.
[4] Using methyl bromide or sulfuryl fluoride, each chamber can be used three times per day (Line2 x 3 = Line4); for phosphine, each fumigation takes 5 days (15 times longer than MeBr and SF), so each chamber can be used the equivalent of 1/5 of a time per day (Line2 x (1/5) = Line4).
[5] Divide commodity to be treated (Line1) by total harvest capacity of each chamber (Line3 x Line4)
[6] One-time cost to purchase chambers, based on the approximate cost of dry van trailer that could be used for fumigation available from American Trailer Exchange, See Dry Van Trailers at www.amtrex.net/AMTREXsalesinventory.htm, Accessed Dec 16, 2011.
[7] Assumes rate of 1.5 lbs/1,000 cu ft [24 g/cu m] for methyl bromide, 2 lbs/1,000 cu ft [32 g/cu m] for sulfuryl fluoride, and 0.25 lbs/1,000 cu ft [4 g/cu m] for phosphine.

Dried Fruit

The dried fruit industry has already replaced a large portion of methyl bromide with phosphine and sulfuryl fluoride in processing dried fruits. The USG nomination for methyl bromide is based on areas where the industry still has dried fruit stored in/near processing equipment and where low temperatures limit sulfuryl fluoride because of reduced efficacy on eggs of target pests.

Table 6 displays information on the dried fruit industry and methyl bromide authorized by the Parties in 2013. Over the five-year period from 2006 to 2010, an average of approximately 478,000 metric tons of dried fruit (includes raisins, prunes (dried plums), and figs) valued at more than $535 million were produced each year.

Table 6. Summary information on dried fruit industry and methyl bromide

Production and Value	
Commodity Metric Tons Produced per Year [1]	478,050
Total Annual Gross Revenue [2]	$ 616,190,120
MeBr Authorized	
MeBr Authorized by Parties 2013 (kg)	282
Commodity to be Treated with 2013 Authorized MeBr (cu m) [3]	11,736

[1] Five year average from USDA NASS, 2006-2010.
[2] Based on five-year average of combined total crop values, 2006-2010
[3] Based on use rate of 1.5 lbs per 1,000 cubic feet, 24 kgs per 1,000 cubic meters.

The results of the economic analysis for dried fruit are presented in Table 7. The analysis indicates a small cost savings each year ($3,100) from a transition to sulfuryl fluoride. It is possible that no chambers would be needed because sulfuryl fluoride, like methyl bromide can be used indoors without damaging electrical equipment.

The analysis for phosphine examines the cost of purchasing fumigation chambers to fumigate dried fruit outside of the storage warehouse. Assuming that fumigation can occur year-round and there is no particular time when the majority of it is fumigated, the industry will need to purchase two fumigation chambers at a total cost of $10,000. After the initial investment in fumigation chambers, the industry will save on fumigation each year (approximately $3,900 per 125 cubic meter) from switching to phosphine.

Table 7. Analysis of transition to alternatives for dried fruit treated with methyl bromide

		Methyl Bromide	Sulfuryl Fluoride	Phosphine
1	Cubic meters to be treated with 2013 authorized MeBr [1]	11,736	11,736	11,736
2	Capacity of fumigation chamber (cu m) [1]	125	125	125
3	Time available to fumigate (days) [2]	365	365	365
4	One day capacity of each chamber (cu m) [3]	374	374	25
5	Total chambers needed [3]	0	0	2
6	Total Cost of Fumigation Chambers (@ $5,000 each) [1]	$ 0	$ 0	$ 10,000
7	Cost difference between MeBr and alternative	na	$ -	$ 10,000
8	Total gas for cubic feet needing fumigation (kgs) [1]	282	376	47
9	Price of fumigant gas ($/kg)	$ 33.07	$ 16.53	$ 9.37
10	Total cost of fumigant gas ($)	$ 9,326	$ 6,217	$ 440
11	Cost difference between MeBr and alternative		$ -3,109	$ -8,885
12	Total cost of fumigation space and fumigant	$ 9,326	$ 6,217	$ 10,440
13	Total cost difference between MeBr and alternative		$ -3,109	$ 1,115
14	Cost difference as % of revenue		0.00%	0.00%

[1] See notes for this Line from Table 5.
[2] Assumes that fumigation occurs year-round; no time constraint.
[3] No chambers are needed for methyl bromide and sulfuryl fluoride because they can be used in existing storage facilities. Chambers are only needed for phosphine because it is corrosive to electrical equipment.

Dates

Table 8 displays information from the date industry. Over the period from 2006 through 2010, an average of 19,000 metric tons of dates with a value of more than $32 million were produced each year.

Table 8. Summary information on date industry and methyl bromide

Production and Value	
Commodity Metric Tons Produced per Year [1]	19,396
Total Annual Gross Revenue [1]	$ 32,693,000
MeBr Authorized	
MeBr Authorized by Parties 2013 (kg)	350
Commodity Treated with 2013 Authorized MeBr (cu m) [2]	14,567

[1] Four year average from USDA NASS, 2006-2010.
[2] Based on use rate of 24 kgs per 1,000 cubic meters (1.5 lbs per 1,000 cubic feet).

The results of the economic analysis for dates are presented in Table 9.

Sulfuryl fluoride is the only alternative considered for dates. A transition to sulfuryl fluoride will result in cost savings for the industry of more than $3,800 per year.

Table 9. Analysis of transition to alternatives for dates treated with methyl bromide

	Methyl Bromide	Sulfuryl Fluoride
Cubic meters to be treated (CUE request)	14,567	14,567
Total gas needed for fumigation (kgs) [1]	350	467
Price of fumigant gas ($ / kg)	$ 33.07	$ 16.53
Total cost of fumigant gas ($)	$ 11,574	$ 7,716
Cost difference between MeBr and alternative		$ -3,858
Cost difference as % of gross revenue (from Table 8)		-0.01%

[1] Assumes rate of 1.5 lbs/1,000 cu ft [24 g/cu m] for methyl bromide, 2 lbs/1,000 cu ft [32 g/cu m] for sulfuryl fluoride.

CONCLUSION

This sector includes walnuts, dried fruit (prunes, raisins, figs), and dates, all of which are subject to infestation by several insect pests. Methyl bromide is needed for the walnut industry at peak harvest, when low temperatures limit the use of phosphine and impacts the ovicidal efficacy of sulfuryl fluoride. Dates also depend upon a rapid fumigation during harvest and low temperatures limits the effectiveness of sulfuryl fluoride and phosphine takes too long. Methyl bromide is needed by the dried fruit industry to disinfest dried fruit in storage when the fruit is stored at processing facilities. Phosphine is corrosive in these situations and lower than optimal temperatures limit sulfuryl fluoride's efficacy on eggs.

USG is requesting methyl bromide for this sector to allow time for the industry to purchase equipment, build chambers, modify structures, and/or develop experience using alternatives. The current registration of sulfuryl fluoride, as ProFume®, remains unchanged in the U. S. for the uses included in this nomination and is considered to be a viable alternative for some uses. However, it should be noted that EPA has published a proposed order to revoke all tolerances in response to a petition. For additional information, please refer to the links on EPA's website: http://www.epa.gov/oppsrrd1/registration_review/sulfuryl-fluoride/evaluations.html.

CITATIONS

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